Emergency Report No. 2

MEDICAL RESEARCH COUNCIL
INDUSTRIAL HEALTH RESEARCH BOARD

HOURS OF WORK, LOST TIME AND LABOUR WASTAGE

LONDON
HIS MAJESTY'S STATIONERY OFFICE
1942
Price 6*d*. net

THE BOARD

SIR W. WILSON JAMESON, M.D., F.R.C.P. (Chief Medical Officer, Ministry of Health) (*Chairman*).

F. C. BARTLETT, M.A., F.R.S. (Professor of Psychology in the University of Cambridge).

SIR HENRY H. BASHFORD, M.D., F.R.C.P. (Chief Medical Officer, General Post Office).

G. R. A. BUCKLAND (Ministry of Labour and National Service).

HAROLD E. CLAY (Acting Assistant General Secretary of the Transport and General Workers' Union).

MRS. STUART HORNER, M.B., B.Sc. (H.M. Medical Inspector of Factories, Factory Department, Ministry of Labour and National Service).

DONALD HUNTER, M.D., F.R.C.P. (Physician to the London Hospital).

R. E. LANE, M.B., F.R.C.P. (Medical Officer, The Chloride Electrical Storage Co., Ltd., Manchester).

SIR KENNETH LEE, LL.D. (Chairman, Messrs. Tootal Broadhurst Lee Co., Ltd., Manchester).

B. A. MCSWINEY, M.B., Sc.D. (Professor of Physiology, St. Thomas's Hospital, London).

SIR DUNCAN WILSON, C.V.O., C.B.E. (late H.M. Chief Inspector of Factories, Home Office).

AIR VICE-MARSHAL SIR DAVID MUNRO, K.C.B., C.I.E., M.B., F.R.C.S.E. (*Secretary*).

TERMS OF REFERENCE

To suggest problems for investigation, and to advise upon or carry out schemes of research referred to them from time to time by the Medical Research Council, undertaken to promote better knowledge of the relations of methods and conditions of work to functions of the human body, having regard both to the preservation of health among the workers and to industrial efficiency; and to take steps to secure the co-operation of industries in making widely known such results of this research work as are capable of useful application to practical needs.

TEMPORARY OFFICES

c/o London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1.

PREFACE

The Industrial Health Research Board is part of the organisation of the Medical Research Council (under the Committee of Privy Council for Medical Research). It was formerly called the Industrial Fatigue Research Board, and was first appointed in direct succession to the Committee on the Health of Munition Workers set up during the war of 1914–18. The work for which the Board is responsible is defined in its terms of reference on page ii.

The Board's first emergency report, published in 1940, outlined the general conclusions of the Health of Munition Workers' Committee of the last war and the research work of the years between the two wars, in so far as these related to industrial work and fatigue, to the environmental conditions—lighting and vision, heating and ventilation—and to the problems of accident proneness and sickness absence. Although the primary need during the present war so far has been for the practical application of knowledge of industrial physiology and psychology already gained, further research under the prevailing conditions of industrial work was clearly desirable.

This second report accordingly gives the results of an investigation made in a number of munition factories during the period from the outbreak of war until the end of June, 1941. It deals further with the question of hours of work, and with some of the hindrances to maximum output, including lost time, labour wastage and, for a few factories, the differential diagnoses of sickness absence.

The problem of output in war-time necessarily differs from the corresponding problem in normal times. During a war the national interest demands a maximum output maintained for as long as may be necessary, hence some of the peace-time motives for restricting hours, *e.g.* the provision of adequate leisure and recreation for the workers, tend to be sacrificed. To believe, however, that maximum output can be secured by working all the hours not urgently required for sleeping and eating, has been shown by past experience to be fallacious. If a man or woman is forced to work hours which are physiologically too long, the consequences are expressed by a gradually diminishing success at work, by increased accidents, or by absence from the factory.

In November, 1915, the Health of Munition Workers' Committee concluded that if the maximum output was to be secured and maintained for any length of time a weekly period of rest must be allowed, and that this weekly period should be Sunday. Sunday work, a foreman said, gave " six days' output for seven days' work on eight days' pay ". Nevertheless, it remains true that, within limits, increased hours can increase output, even though the average hourly output may be reduced. It is for management in conjunction with the representatives of labour to find out where the average hourly decrease neutralises the effect of the longer working day—in short, at what stage longer hours cease to be productive.

Much of the substance of the present report was recently given in evidence, on behalf of the Board, before a sub-committee of the Select Committee on National Expenditure. The Twenty-first Report (Session 1940–41) of the Select Committee contains many references to the past and present work of

the Board, and to the part which the Board should play in the further study of problems related to the best use of labour in the national war effort. From among these references the following may be quoted :—

> *" There are many problems, affecting the best use of labour, which cannot be solved without scientific study. The number of working hours per week which gives the best output in any particular kind of industry is one of the most important of these. It may be difficult for manangements or Departments to undertake such scientific investigation, particularly in time of war. But the Industrial Health Research Board exists for precisely this purpose. This scientific body is part of the organisation of the Medical Research Council and is maintained out of public funds."*
>
> *" Recommendation 2.*
>
> *The Industrial Health Research Board should work in the closest co-operation with the Production Departments, should advise them, and should be strengthened so as to be able to carry out investigations on a wide scale into the main problems of industrial health and efficiency."*
>
> *" Recommendation 4.*
>
> *The Industrial Health Research Board should carry out investigations to determine the best length of working week for a wide range of different kinds of work and for men, women and juveniles."*

Comments made on behalf of H.M. Government, relating to these recommendations, have been published in the Twenty-fifth Report of the Select Committee. Recommendation 2 was fully endorsed, subject to definition of the research functions of the Board in relation to the advisory responsibilities of the Ministry of Labour. The comment on Recommendation 4 may be quoted in full, being especially relevant to the subject of the present publication, as follows :—

> *" The investigations already carried out by the Board indicate that, over an extended period, weekly hours of work should not exceed 60 for men and 55 for women, and it has appeared to be more useful to take all possible steps to restrict weekly hours within these limits than to have further investigations made which were unlikely to produce different results. It is proposed, however, to obtain information as to sections of industry or particular kinds of work into the conditions of which special enquiry appears to be desirable and to ask the Board to make any investigations they may consider to be appropriate."*

A detailed summary of the results obtained in the investigations already carried out, as mentioned above, is given in the present report ; and the Board's research workers are continuing their studies along the further lines which are also indicated. It is hoped to publish the full results when conditions permit.

5th January, 1942.

HOURS OF WORK, LOST TIME AND LABOUR WASTAGE

CONTENTS

I.—LOST TIME

Introduction

The problem of maximum production by the human being is not the simple proportion sum of " if one unit of work is done in one hour by one man then twelve units of work will be done by him in twelve hours ". The idea of man as a machine dies hard; but even machines cannot be worked indefinitely without attention. Still less can the human being. For maximum industrial production there must be a regular flow of material, the machines must be in perfect working order and the worker of the machine must be in good health. For good health he needs at least adequate food, regular sleep, regular periods of leisure and reasonable conditions at work. War-time, judging by this war

and the last, tends to obscure these truths. Since the human being is not a machine he has the power to " rise above himself ", to make himself by force of will produce more work than is his ordinary maximum. Hence the amazing success of emergency efforts. Unfortunately, industry often fails to acknowledge the extraordinary effort as extraordinary, and complains when the extraordinary gives place to the ordinary, or below ordinary.

This report gives an interim account of some investigations into the human factors that have affected production during the present war. Such hindrances as fewer orders, machine stoppages, time spent in air-raid shelters or lost owing to enemy action are sufficiently obvious to be recognised by everyone : if out of a working day of eight hours, one hour is spent in waiting for work and a quarter-of-an-hour in an air-raid shelter, or if a particular machine breaks down, it needs little arithmetic to prove that there will be lowered production. In the course of this inquiry such extrinsic reasons for lessened production have been encountered, but they are not the main theme.

Less obvious, though not less important, are the factors within himself that interfere with the worker's capacity to remain at his peak of productive effort. We know from experience of the last war and from numerous researches since, that after a certain number of hours the best will in the world cannot keep up the pace. If the work is of such a nature that the machine is merely the instrument of the worker, then the human variation in well-being will show clearly ; if the human being is rather an appendage to the machine, the effects are less striking but still present. The majority of processes are mixed.

This investigation, then, has for its main problem a study of the time lost through sickness, injury, and absence without permission ; it also includes data on hours of work and on output in relation to these hours, and finally a short study of labour wastage.

There has been frequent reference in the press and elsewhere to the time lost through sickness absence, accidents and fatigue, but it is important to know how much working time is really lost in these ways.

Facilities for examining the question were at first restricted to a few Government factories, but later others controlled by the Ministry of Supply were included. During the last few months, additional facilities have been provided and the investigation now covers 50 factories, representing approximately 200 000 workers.

Throughout this inquiry the lack or unsuitability of records was a severe handicap. Thus in most factories the records cover only the normal working week of 47 hours and *take no account of absenteeism during overtime*. Some include in their records absenteeism however short ; others ignore all less than one whole day, and some only note sickness absenteeism of three or more days.

If the amount of lost time is difficult to assess, the causes are still more so. Some organisations classify the lost time as due to sickness, injury, leave, and absence without permission, but others do not distinguish between sickness and injury nor between absence with and without permission. In this inquiry the results have been arranged to show the time lost through sickness, injury, and absence without permission where this was possible. These three categories include the relevant causes of lost time but, as already stated, they cover only the normal week of 47 hours.

Results obtained

General tendencies

In most of the factories included in this investigation, the workers were employed on ordinary day and night shifts. Selections from the results obtained are given in Fig. 1. They refer to two factories and show—

(*a*) the time lost through absence without permission ;

(*b*) the time lost through sickness and injury ;

(*c*) the total time lost due to these causes ;

(*d*) the average number of hours actually worked per week.

Factory B employed about 3,500 workers, chiefly men. In Factory C there were approximately 5,000 men. The results refer to a sample week in each month from June, 1939, to June, 1941, and in each case the time lost has been expressed as a percentage of the normal week of 47 hours. The results so obtained under-estimate the total time lost during the week, because they exclude the *higher rate of loss during periods of overtime, especially on Saturday afternoons and Sundays.**

The general trend of the curves shows that the percentage of time lost through sickness, injury, and absence without permission tended to increase from the outbreak of war to the beginning of 1941. The chief variations within this general trend were :—

(*a*) An increase in lost time in September and October, 1939, following an increase in the hours of work after the outbreak of war. In most factories this increase was followed by a gradual fall in both hours of work and lost time, and there is little doubt that, up to the emergency period which began at the end of May, 1940, work proceeded at a comparatively leisurely rate.

(*b*) The effect of the influenza epidemic which reached a peak in February, 1940, was more severe in some districts than in others. It will be noticed that the increase in sickness absenteeism was accompanied by an increase in absence without permission. This suggests that part of the latter was also due to sickness which was not covered by a medical certificate and was, in consequence, not recorded as sickness.

(*c*) An increase in lost time during the height of the emergency period in June and July, 1940, following the collapse of France. In most munition factories the official hours of work during these two months were from 70 to 75 per week. These long hours, together with the extra effort made by the workers in response to the appeal for more production, caused a sharp increase in the amount of time lost and especially in absence without permission. Workers throughout the country showed increasing signs of fatigue and strain. Requests for time off were more frequent, and in some cases the workers made their own arrangements for rest. Interviews with managers and workers in several factories showed that the outbursts of energy and patriotic enthusiasm which characterised the first phase of the

* From samples taken in different factories it was found that when the hours of work were from 70 to 75 per week, the total time lost during the week (*i.e.* normal hours + overtime) was from three to four per cent. higher than the time lost during the normal hours alone. Thus, if the time lost during the normal week of 47 hours was 8 per cent., then the total time lost during normal hours + overtime was about 11 or 12 per cent., *i.e.* an increase of three to four per cent. When the hours of work were 60 to 65 per week the increase was one to two per cent.

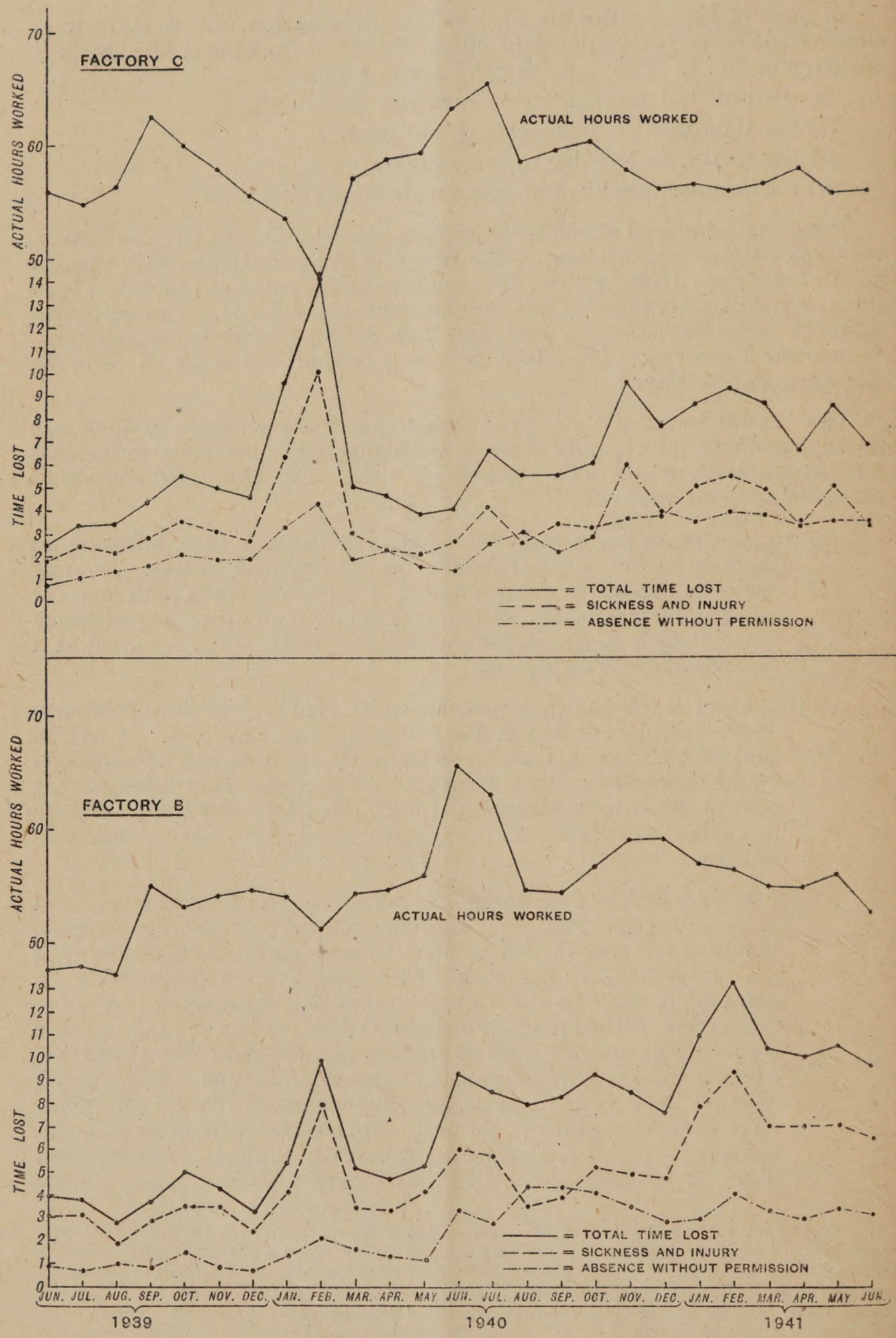
FACTORY C
ACTUAL HOURS WORKED
TIME LOST
ACTUAL HOURS WORKED
= TOTAL TIME LOST
= SICKNESS AND INJURY
= ABSENCE WITHOUT PERMISSION
FACTORY B
ACTUAL HOURS WORKED
TIME LOST
ACTUAL HOURS WORKED
= TOTAL TIME LOST
= SICKNESS AND INJURY
= ABSENCE WITHOUT PERMISSION
JUN. JUL. AUG. SEP. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY JUN.
1939
1940
1941

FIG. 1

emergency period were weakening under the strain of the long hours of work. The workers began to feel bored and stale and were more easily irritated and annoyed. Typical remarks were :—

"We are getting run down and bad-tempered and shall be in bed most of the winter if we don't get some rest."

"We are just tired out and need some fresh air and a rest. They could get the same production if they closed down on Sundays."

"We manage to keep going, but it needs all the willpower we've got and we shall have to pinch time off if we don't get it. Most of us are taking tonics, and in my own case it costs almost 10/- a week."

The need for a systematic curtailment of working hours was officially recognised on 25th July, 1940, and the reduction which followed was reflected in better time-keeping. This improvement was greatly assisted by a system of authorised holidays of three to seven days, which began in the latter part of August and was continued throughout September. In most firms some form of holiday rota scheme was adopted, but in others a part of the factory was closed.

(*d*) From September, 1940, onwards the amount of time lost in certain areas was affected by the increased frequency and intensity of air-raids, which dislocated home life and transport. During the winter months it was also increased to some extent by seasonal ailments, and in the first two months of 1941 by unusually severe weather. The gradual introduction of women workers, who lost more time than men, also helped to swell the total. Thus, in Factory B women were first introduced in June, 1940, and by the end of June, 1941, they formed some 30 per cent. of the total number employed. In Factory C they were not introduced until April, 1941, and the number employed at the end of June was only 9 per cent. of the total. As separate records for men and women in these factories were not kept, it was not possible to show how much of the increase was due to the increasing number of women employed.

(*e*) The most recent records (April to June, 1941) show an improvement in the amount of lost time over that observed in the winter months. In view of the statements made in various quarters to the effect that absenteeism during this period was excessive, the average weekly figures from a number of representative firms in widely different parts of the country are given in Table I.

TABLE I.—*Average amount of time lost during the normal week of* 47 *hours in April, May and June,* 1941. (*Results expressed as a percentage of the normal week of* 47 *hours.*)

Factory.	No. of workers.	Actual hours worked.	*Per cent. of normal time lost.*			Total.
			Sickness.	Injury.	Absence without permission.	
A	6,000	48·6	4·7	0·2	3·8	8·7
B	3,500	54·6	5·9	0·9	3·2	10·0
C	5,000	56·4	2·8	0·6	3·9	7·3
D	15,000	54·3	2·5	0·6	3·6	6·7
E	3,000	51·9	5·6	0·3	0·8	6·7
F	5.000	54·0	3·4	0·2	7·4	11·0
G	4,500	50·7	2·4	0·4	0·8	3·6
H	3,500	53·5	2·5	0·9	2·9	6·3
I	1,100	55·7	1·3	0·3	6·2	7·8
J	1,500	55·7	1·9	0·7	6·0	8·6
K	1,000	52·0	2·1	0·3	2·0	4·4
L	13,000	53·7	—	No records	—	5·8
M	6,000	56·9	—	No records	—	5·1

The average amount of time lost through sickness, injury and absence without permission in these factories during the normal week of 47 hours was 7·1 per cent., and the time lost through absence without permission was 3·7 per cent. Considering the hours of work, transport difficulties and the influx of new workers unfamiliar with factory life, the time lost was not excessive. In this period the official hours of work were usually from 60 to 65 per week for men and from 55 to 60 for women. From information since obtained it is evident that, if lost overtime had been included, the totals in the factories given in the Table would have been increased by from 1 to 2 per cent.

In some special types of factories, not here included, the time lost exceeded the figures given in the Table, but the increase was due to the special conditions of work, and such cases were the exception rather than the rule.

The preceding remarks refer to general tendencies observed at different stages of the investigation. Particular aspects are discussed in more detail below.

Time lost through sickness

Time lost through sickness is usually computed from the data on medical certificates. In Government factories a medical certificate must be produced when a worker is absent for two consecutive days, but in other organisations it is unusual for a certificate to be required for sickness absences of less than three days. Before work is resumed a certificate of fitness must generally be produced. Failure to comply with these rules renders a worker liable to dismissal, but under war-time conditions the penalty is seldom rigidly enforced.

Although considerable improvement has taken place in recent years, there is still a wide divergence between the best organisations and the rest, in regard to the accuracy and consistency of the sickness records. Apart from these difficulties, it is repeatedly alleged that certain medical practitioners are not always very conscientious in the granting of certificates. Also, the various labels attached to certain complaints are vague. Nevertheless, although rarely free from error, sickness records when consistently kept are of value.

The results obtained from the factories included in this inquiry show that, as a rule, the greater proportion of the total time lost was due to sickness. This was particularly noticeable before the emergency in June, 1940, but afterwards sickness absenteeism was often closely approached, and sometimes exceeded, by the time lost through absence without permission. As in ordinary times, the sickness absence rate was higher for women than for men.

In some factories it was possible to classify by medical diagnosis the absence due to sickness, and two fairly typical examples are given in Table II. The results cover the period from the beginning of the emergency to the end of the year and are classified according to the most frequent causes of absence*, viz. :—

(*a*) Colds and influenza, tonsillitis, laryngitis, bronchial catarrh.

(*b*) Gastric affections, including dyspepsia, colic, biliousness.

(*c*) Nervous breakdowns, neurasthenia, nervous debility, nervous exhaustion.

(*d*) Rheumatism and allied affections.

(*e*) Various septic conditions, carbuncles, boils, ulcers.

---

* See Industrial Health Research Board Report No. 75.

TABLE II.—*Sickness absenteeism classified according to certain disease categories.* (*Results expressed as the average number absent per* 1,000 *workers per week.*)

Factory C (Men)

Year and month.	No. of workers.	Weekly hours of work.	Number absent in disease category. (a)	(b)	(c)	(d)	(e)	Total.
1940.								
June	4,305	70¾	7·9	6·6	4·2	2·6	1·7	23·0
July	4,410	67	13·4	8·6	7·3	5·2	2·3	36·8
August ..	4,673	65¾	8·1	6·6	5·6	3·8	1·6	25·7
September ..	4,772	65¾	8·7	4·2	3·2	3·7	1·2	21·0
October ..	4,792	65¾	10·4	3·8	2·3	4·2	1·0	21·7
November ..	4,801	65¾	10·6	5·1	2·3	3·8	0·9	22·7
December ..	4,809	65¾	16·2	4·1	2·3	3·4	1·0	27·0

Factory N (Women)

1940.								
June	1,496	67½	2·6	5·7	11·2	1·2	0·5	21·2
July	1,792	63	7·4	8·6	17·9	2·1	1·1	37·1
August ..	1,949	60½	11·9	8·4	24·0	2·1	0·3	46·7
September ..	2,093	57	13·0	8·8	14·1	1·1	0·7	37·7
October ..	2,355	57	16·8	8·0	8·4	1·7	1·7	36·6
November ..	2,564	57	16·7	9·1	12·9	2·3	1·8	42·8
December ..	2,717	57	21·4	8·9	12·3	4·6	2·4	49·6

Thus, in both factories, the sickness absenteeism was higher in July than in June, 1940, and in Factory N there was a further increase in August in the two main sickness categories. The earlier improvement in Factory C was undoubtedly connected with the introduction of a holiday rota scheme of one week for each worker, which began early in August and lasted about two months. In Factory N, holidays did not begin until the last week in August, when half the factory was closed for one week. The other half was closed during the last week in September. It appears, therefore, that although the increase in sickness absenteeism associated with the longer hours of work in June was retarded by the subsequent reduction in hours, the beneficial effect was greatly accelerated by holidays. The increase during the last two months of the year was due mainly to seasonal factors.

As regards particular ailments, it will be seen that diseases of the respiratory system were the most important cause of absenteeism, and in Factory N the number absent continued to increase in successive months. Gastric affections and nervous conditions were also prominent, especially among the group of women workers. It is known that women are more prone to sickness absence diagnosed as "nerves" than men, but the tendency was doubtless increased by war-time conditions of employment. Yet the workers in these two factories, although occasionally disturbed by air-raid warnings, were never actually subjected to bombardment.

Absence without permission

The absenteeism included in this category was usually of single days taken at irregular intervals. As a rule the worker felt he needed a rest or change, but in some cases he may have been ill. In almost all factories the amount of time lost through casual absence was related to the weekly hours of work, being higher with the longer hours. From September, 1940, this relation was sometimes disturbed by the effects of air-raids on home life and on transport.

In old-established and well-managed factories, casual absenteeism has remained reasonably low since the reduction in hours at the end of July, 1940, but in certain newer and rapidly expanding firms it has been excessive, especially among women. The tendencies in question may be illustrated by the results obtained from Factory D, which for many years has been engaged on munition work, and from two modern factories (E and T). The men in Factory D were employed on the ordinary day shift, and there was no work on Sundays. In Factories E and T the workers were on the three-shift system and, with the exception of the night-shift on Saturday, worked seven days a week. The results, which are given in Table III, are based upon a typical week in July, 1941, and show the percentage number of workers absent without permission on each day of the week.

TABLE III.—*Percentage number of workers absent without permission on each day of the week in (a) an old-established munition factory on the two-shift system with no Sunday work, and (b) two modern factories on the three-shift system with work on Sundays.*

Factory.	No. of workers.	Sex.	Number absent expressed as percentage of number employed.						
			Sun.	Mon.	Tues.	Wed.	Thu.	Fri.	Sat.
D	11,000	Male ..	—	3·4	2·6	2·1	1·8	2·1	5·2
E	6,970	Male ..	13·0	8·8	8·7	8·7	7·5	5·4	20·4
E	9,779	Female ..	20·5	15·7	14·1	15·6	11·3	10·1	37·0
T	2,143	Male ..	10·4	6·0	3·9	5·1	3·1	1·6	2·6
T	3,869	Female ..	20·1	10·3	9·1	11·6	10·7	8·6	10·5

Factories E and T presented a special problem which will be considered more fully in a subsequent report, but it seems fairly certain that the chief reasons for the high rate of casual absenteeism were (i) the long distances and the time taken in travelling between home and factory, (ii) the rapid expansion of these factories and the employment of many workers, especially women, who had little or no previous experience of factory conditions, (iii) the seven-day week, and (iv) the special hazards and often unsatisfactory conditions of the work, *e.g.* poor ventilation. Subsequently to these observations the Saturday afternoon shift and the Sunday morning shift were abolished, so that there was no work between 3 p.m. on Saturday and 3 p.m. on Sunday. It is as yet too soon to determine the effect of this change on absenteeism.

The figures in Table III also give some indication of the positive and negative incentives to work on different days of the week. Thus casual absenteeism was usually much greater on Saturday and Sunday than on other days, and was lowest on Friday (pay-day). The increase on Sunday is interesting, since it shows that many workers were willing to forego the attractions of double pay for Sunday work. Similar figures obtained during the seven-day week during the height of the 19 0 emergency period showed that this tendency was still more striking and widespread.

Time lost by men and women

In all the factories where both men and women were employed, whether on the two-shift or the three-shift system, women lost more time than men. Typical examples are given in Table IV.

TABLE IV.—*Comparison of time lost by men and women.*

Period.	Factory.	Men.		Women.	
		No. in group.	Per cent. absent.	No. in group.	Per cent. absent.
1940					
June to December ..	A	826	5·6	1,850	10·8
June to December ..	E	6,895	14·8	6,739	27·2
June to December ..	K	1,761	4·4	1,378	8·7
1941					
April	B	2,380	7·8	1,073	12·4
July	D	10,820	6·5	765	20·9
April	T	2,192	10·8	3,947	18·0

The women in these factories lost on the average, about twice as much time as the men. It is certain that home duties and family responsibilities were the primary reason, but it appears also that many women brought in from other types of work found it difficult to settle down to factory life.

The three-shift system

Although in most factories the workers were employed on the usual two-shift system, there were several establishments where the three-shift system had been in use for several years. The latter arrangement of hours was usually found in the forges and rolling mills of the heavy metal industries, and occasionally in dangerous occupations such as the manufacture of explosives. Fairly typical examples of the results obtained under these conditions are shown in Fig. 2. They refer to :—

(*a*) A group of approximately 1,000 men almost all of whom worked on shifts of eight hours, though a few were employed on ordinary day and night work (Factory A).

(*b*) Another group of about 1,000 men who, with few exceptions, also worked on shifts of eight hours, though a rota scheme enabled each man to have one day off in seven (Factory H).

The results cover the period from the beginning of the emergency period (June, 1940) to the end of June, 1941. As a comparison, the results obtained in a typical month (April) before the emergency are given.

Unlike the two-shift system, the possible hours of work per man on eight-hour shifts can never exceed 56 per week. These hours were worked in Factory A in June and July, 1940, but afterwards they were less rigidly enforced. In Factory H the possible hours per man remained at 48 per week throughout the period covered by the results.

In both factories, the total time lost through sickness, injury and absence without permission seldom exceeded 5 per cent. The greater part of this was due to sickness absence which, as usual, was higher in the winter months. Casual absence, on the other hand, although it tended to increase throughout the period, remained almost negligible.

The results in general illustrate the superiority, from the standpoint of lost time, of the three-shift system over the more usual two-shift arrangement with its longer hours of work. The significance of this superiority is increased by the fact that the men in Factory A were employed on fairly heavy work, while a large majority of those in the factories discussed in the previous sections were

on light or medium work. It should also be noted that in Factory H, where a rota scheme of one shift off in seven was in use, the amount of time lost was generally small.

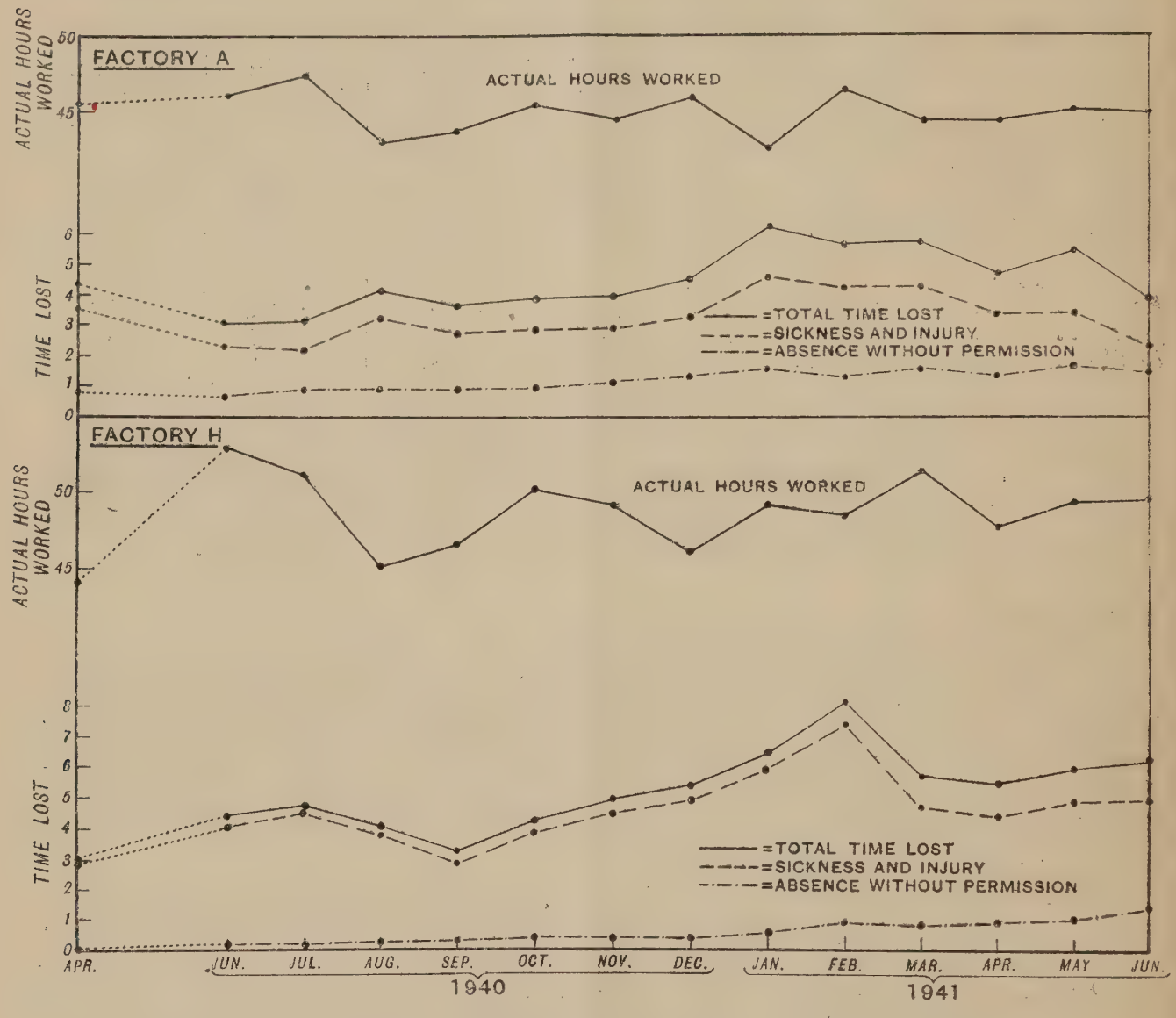

FIG. 2.—(Time lost expressed as percentages of hours worked.)

Summary

Factory records of lost time usually refer to absenteeism during the normal week of 47 hours and take no account of lost overtime. As a rule, the latter is relatively much higher than the former, hence the figures obtained underestimate the total loss. Subject to this limitation, the results collected in this inquiry show that *the time lost due to sickness, injury and absence without permission, when undisturbed by other extraneous factors, varied with the weekly hours of work.* It was usually reasonably low when the hours of work were less than 60 per week, but was higher, and in some cases excessive, when the hours were from 65 to 75 per week. The increase during the height of the 1940 emergency period (June and July) was due mainly to the fatigue, strain and ill-health caused by the longer hours of work, and there is little doubt that a continuation of these hours would have had serious and far-reaching effects. The introduction of week-end breaks, which became fairly general in August, together with holiday rota schemes, was followed by an improvement; and from then onwards there was little evidence that the hours of work were responsible for more than the normal amount of fatigue. The increasing percentage of time lost after September was due partly to seasonal causes and partly to the effects of air-raids on home life and to difficulties of transport.

Women lost more time than men, even when the type and conditions of work were fairly similar for both sexes, and for this home duties and family responsibilities were largely responsible. A substantial part of the total time lost by both men and women was due to sickness.

Unexplained absenteeism of comparatively short duration rose fairly sharply after the hours of work were increased. This type of absenteeism was due mainly to the desire for rest or for a change from the monotonous conditions of work, but towards the end of the year it was also affected in some places by disturbances due to air-raids. As might be expected, voluntary absenteeism increased at week-ends, especially during the seven-day week.

II—HOURS AND OUTPUT

Introduction

This section gives the results of a study of the hours of work, and of the output in relation to these hours.

The effect of changes in the weekly hours of work is usually reflected in the hourly rate of working and in the total output produced. For perfect demonstration of the relationship, the work should be of such a nature that accurate records can be kept and that there are no significant changes, apart from hours, in the type or conditions of the work. Since the beginning of the war, established operations have been extended and new processes introduced, while the transference or replacement of workers has proceeded at an increasing pace. The result has been that suitable output records over a long period were impossible to get. The best that could be done, in the rapidly changing conditions, was to restrict the collection of records to a limited number of experienced workers who were regularly employed on the same type of work.

In some groups it was possible to measure output directly, but in others piece-rate earnings had to be used as an index of the amount done. The results so obtained have, whenever possible, been checked against the output trend observed in the department or factory as a whole. In spite of various difficulties, the results may be regarded as fairly representative of output trends in certain types of work.

They cover the period from the end of May, 1940, when the hours of work were increased, to the end of April, 1941. For purposes of comparison, the results for April, 1940, since this month was unaffected by holidays or other disturbing influences, are also given. The data include :—

(*a*) The average possible hours of work per week (when known). These do not include meal times.

(*b*) The average number of hours actually worked per week.

(*c*) The average hourly output (or piece-rate earnings), expressed as a percentage of the corresponding output or earnings for April, 1940.

(*d*) The weekly output, obtained by multiplying the number of hours actually worked by the hourly output.

Results were obtained from ten factory groups, but in this report only representative samples have been given.

Results

1. *In groups where most of the work is mechanised*

(*a*) *Group A7.*—The effects of this type of work may be illustrated by the results obtained from 115 female workers engaged in work that varied from the highly automatic to handwork (see Fig. 3 and Table V).

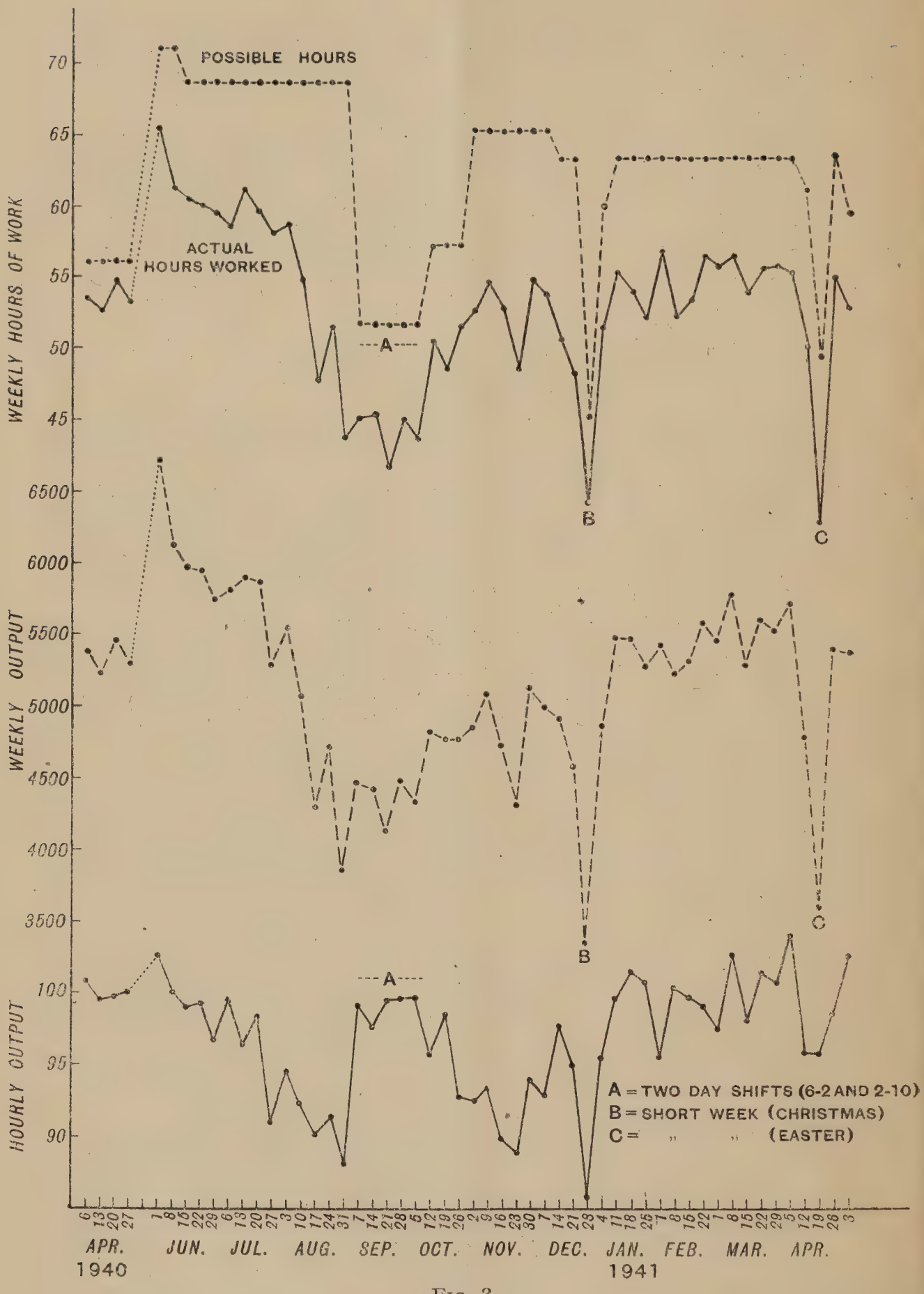

FIG. 3

In the months of June, July and August, 1940, the possible hours of work for this group were approximately 69 per week. During this period there was a progressive reduction in hourly output and in the number of hours worked, and hence in weekly output.

The chief cause of this decrease was undoubtedly the adverse effect of the long hours on workers and machines. Voluntary absenteeism became

TABLE V.—*Monthly summary of the results in Fig. 3.*

Year and month.	Average possible hours of work.	Average hours worked.	Hourly output.	Weekly output.
1940				
April	56·0	53·4	100·0	5,340
June	69·5	61·2	99·5	6,089
July	68·5	59·2	96·3	5,701
August	68·5	51·2	91·3	4,675
September ..	51·5	44·1	98·2	4,331
October	55·5	49·2	95·8	4,713
November ..	65·0	52·4	91·5	4,795
December ..	59·0	47·5	92·8	4,408
1941				
January	62·5	53·6	98·4	5,274
February	63·2	54·3	99·0	5,376
March	63·2	55·0	100·4	5,522

increasingly frequent, and the workers showed unmistakable signs of fatigue and strain. Mechanical efficiency was affected by the extra wear on the machines and the lack of opportunity for overhaul and repairs. It was also reduced by minor, and sometimes major, stoppages, due to the impaired ability of the worker to attend to the machine.

Towards the end of August, the flow of production, especially during the night, was seriously interrupted by air-raid warnings. As a result, the night-shift was discontinued, and two day-shifts, from 6 a.m. to 2 p.m. and from 2 p.m. to 10 p.m., were introduced. This arrangement was continued for five weeks while inside shelters were being built, and during this period there was an increase in hourly output of about 10 per cent. over that of the preceding week. This increase was attributed by the management to the improved condition of the workers and to the opportunity for overhauling the machines. A series of short holidays in August and September also helped.

After a transition period of about three weeks, all the workers were again employed on the usual shifts and the possible hours of work reached approximately 65 per week. The fall in hourly output which began early in October and continued until late in November was due mainly to increased enemy activity, which not only interfered with the rhythm of work, but, because of the time taken for power to develop, caused a reduction of machine speeds for 30 to 45 minutes when work was resumed after a stoppage. The improvement in hourly output from the last week in November coincided with the beginning of a period of reduced air activity and the general adoption of the " spotter " system. As the " spotters " became more efficient, there was less interference with production. From the end of December to the middle of March no warnings were given.

In general, the results obtained from this group of workers show that as the hours of work were increased beyond a certain point, the output tended to decrease. Throughout the period covered by the results, the output seldom rose above the April or pre-emergency level; this was due in part to the highly mechanised nature of most of the operations, which prevented any increase beyond that allowed by the speed of the machines, and partly to the high level of efficiency previously reached. The course of the weekly output, in consequence, tended to follow very closely the variations in the number of hours worked, which, in turn, were partly, though by no means entirely, dependent on the possible hours of work. Because of a number of disturbing and fluctuating

external influences, it is difficult to make any effective comparison between hours of work and output, except over a long period. Nevertheless, the period 1st June to 17th August is suggestive. During this period, which was practically free from air-raid disturbances, the possible hours of work averaged approximately 69 per week and there was a substantial fall in hourly and weekly output.

Groups A1, A2 and A3

Results have also been obtained from three sections of Factory A. Although each section was an independent unit, the general type and conditions of work were very similar, as the following details show:—

Group A1.—Records were obtained from a group of 75 men in a factory

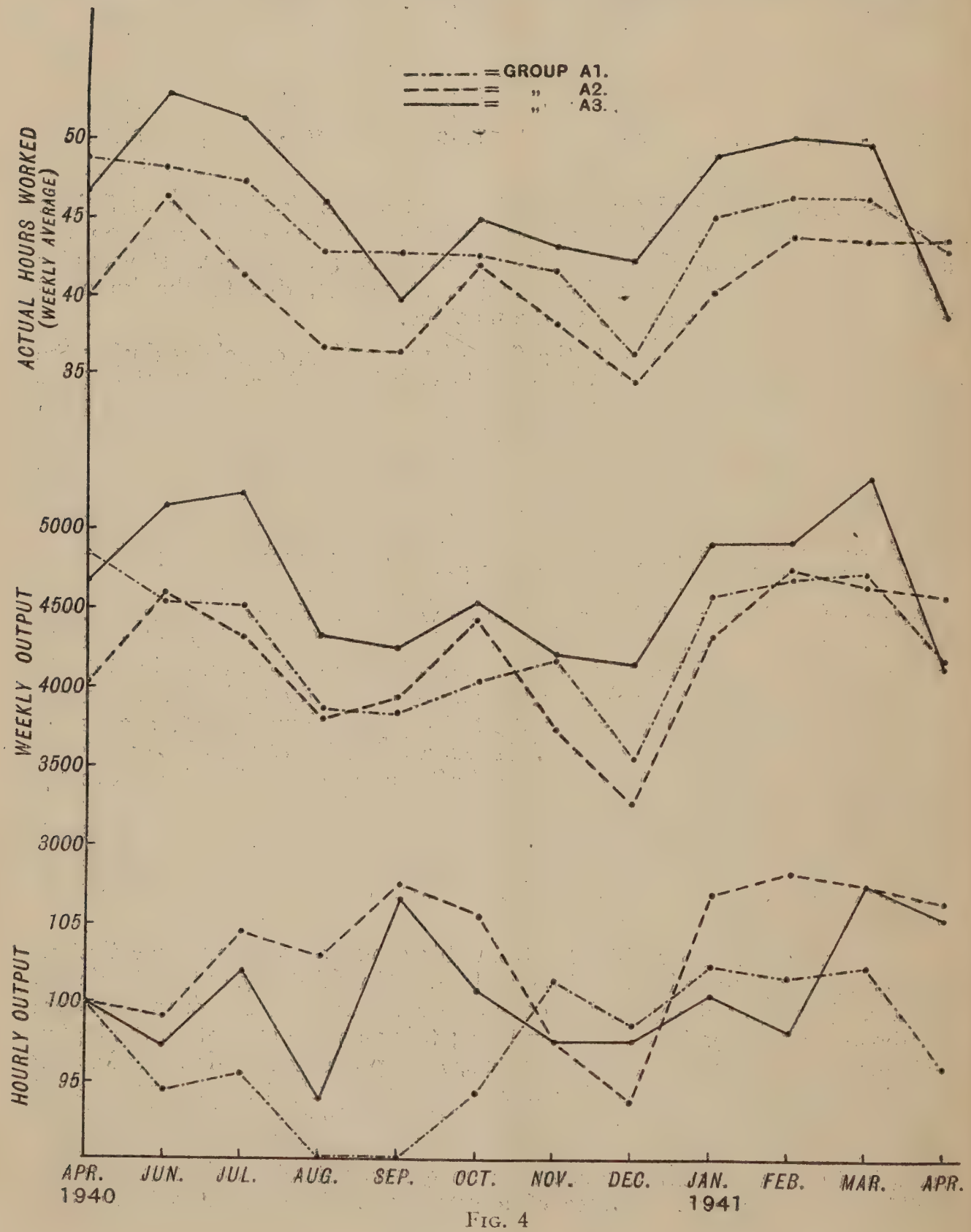

FIG. 4

where the equipment was modern, and the work fairly light, but there was much smoke and heat. All the men were on eight-hour shifts. Work was continuous throughout the week.

Group A2.—In this group there were 190 men employed in a mill which was modern, spacious, and well equipped with machinery, but there was more handling of material and the work was heavier than in Group A3. Most of the men were on eight-hour shifts.

Group A3.—The 190 men in this group were employed in a factory with modern equipment, the work was light but hot, and there was much smoke. The work was done with a very modern and highly mechanised plant, and there was scarcely any man-handling of material. Almost all the men were on eight-hour shifts.

TABLE VI.—*Monthly averages of hours worked, hourly output, and weekly output.*

Year and month.	Average number of hours worked.			Hourly output.			Weekly output.		
Group ..	A1.	A2.	A3.	A1.	A2.	A3.	A1.	A2.	A3.
1940									
April	48·8	40·0	46·8	100·0	100·0	100·0	4,880	4,000	4,680
June	48·2	46·4	53·0	94·4	99·1	97·2	4,550	4,598	5,152
July	47·3	41·2	51·3	95·5	104·6	102·1	4,517	4,309	5,238
August ..	42·9	36·8	46·1	90·3	103·0	93·8	3,874	3,790	4,324
September ..	42·9	36·5	39·8	89·8	107·6	106·7	3,852	3,927	4,247
October ..	42·7	42·1	45·0	94·8	105·3	100·9	4,048	4,433	4,540
November ..	41·7	38·3	43·3	101·3	97·3	97·6	4,224	3,727	4,226
December ..	36·2	34·6	42·4	98·5	93·6	97·7	3,566	3,239	4,142
1941									
January ..	45·0	40·4	49·0	102·3	106·9	100·6	4,603	4,319	4,929
February ..	46·4	43·9	50·2	101·7	108·3	98·1	4,719	4,754	4,925
March	46·2	43·5	49·7	102·3	107·4	107·6	4,726	4,672	5,348
April	42·9	38·8	43·7	96·0	106·3	105·2	4,118	4,124	4,597

In these groups, the potential hours of work remained practically unchanged at 56 per week throughout the period covered by the investigation. There were, however, considerable variations in the number of hours actually worked. Thus, after the appeal for more production at the end of May, 1940, there was a general tightening-up of the hours and conditions of work in Groups A2 and A3, and throughout June and July all the men worked the full seven shifts per week. In Group A1, the men had been working full time since the beginning of the war.

Considering first the results obtained from Groups A2 and A3, it will be seen that the increase in the number of hours worked in June was accompanied by a slight decrease in the rate of production, but this was followed by an improvement in July. During these two months there were no air-raids, apart from a short warning at the end of June, and the course of the hourly output was roughly inversely related to the hours worked. In August, and again in October, November and December, work was often interrupted by enemy activity, and the effect was reflected in the smaller number of hours worked and also in the lower hourly and weekly output. The lower hourly output was due mainly to the shortage of power and gas for some time after work was resumed. In September there were comparatively few air-raid warnings, but production was reduced to some extent by short holidays. These two factors,

however, had a favourable effect on the rate of working, and the hourly output reached a relatively high level. From January to March, enemy activity was on a reduced scale and, as a result, the number of hours worked reached a normal level and output increased

The results obtained from Group A1 show a fall in hourly output which continued at a varying rate until October. This decrease was said to have been due to trouble caused by a few imported workers, who were dissatisfied with the payment. The grievance was rectified in October, and from then onwards work proceeded more normally. In this group, the type and conditions of work precluded any significant increase in output above the pre-emergency level.

Reviewing the results as a whole, it will be seen that the hourly output in Group A2 increased somewhat more rapidly and tended to remain on a higher level than that of Group A3. This may have some connection with the longer hours worked in Group A3, but it was also connected with the progressive and more highly organised mechanical lay-out in Group A3, which defined the upper limits of production. In both groups, the possibility of increasing hourly output seemed to depend entirely on the size of orders. Whenever these increased, the hourly and weekly output also tended to increase.

2. *In groups where the output is largely dependent on the worker*

(*a*) *Group B.*—The results from this group refer to 200 men. The results obtained are given in Fig. 5 and Table VII.

The outstanding feature of these results was the substantial increase in hourly output which followed the appeal for more production at the end of May, 1940. In the first stage of this period, however, the increase in the hours of work to 73½ per week was accompanied by a notable increase in the amount of time lost through sickness, injury and voluntary absenteeism. Conditions were also disturbed by the temporary concentration of production on one type of article, which first reduced and then facilitated output. At the end of June, the possible hours of work were reduced to 69 per week, and they remained at this figure until the end of October. During the first two months of this period there was practically no improvement in hourly output, but the number of hours worked, and hence the weekly output, declined. This decrease was due partly to the effects of fatigue and partly to an increasing number of machine stoppages and breakdowns. It was checked, and later reversed, by the effects of staggered holidays, which began in the last week of August and were continued throughout September and October. The upward tendency was also helped by the introduction of new machines in October, and by a further reduction in the weekly hours of work.

The decrease in hourly and weekly output which began about the middle of January was due mainly to the dislocation of production caused by the introduction of a new type of operation. In addition to the mechanical difficulties arising from this change, the men were dissatisfied with the new rate of payment. It was also suggested that the Income Tax deductions, which began in January and were based on a period of higher earnings, contributed to the dissatisfaction.

On the whole, the hourly rate of working of this group from June to December tended to vary inversely with the number of hours worked, while the resulting weekly output, though variable, tended to remain at the same general level. The significant increase in hourly output during this period was due, in the first place, to awareness of the national emergency and to the knowledge that wages would not be cut. It was made possible by the dependence of output, especially in the lathe operations, on the effort made by the workers, and was sustained by the higher wages which resulted from the increased production. At the end of May, the men were told " The sky's the limit and

whatever happens we won't cut your rates". They accordingly took off the brakes and let themselves go.

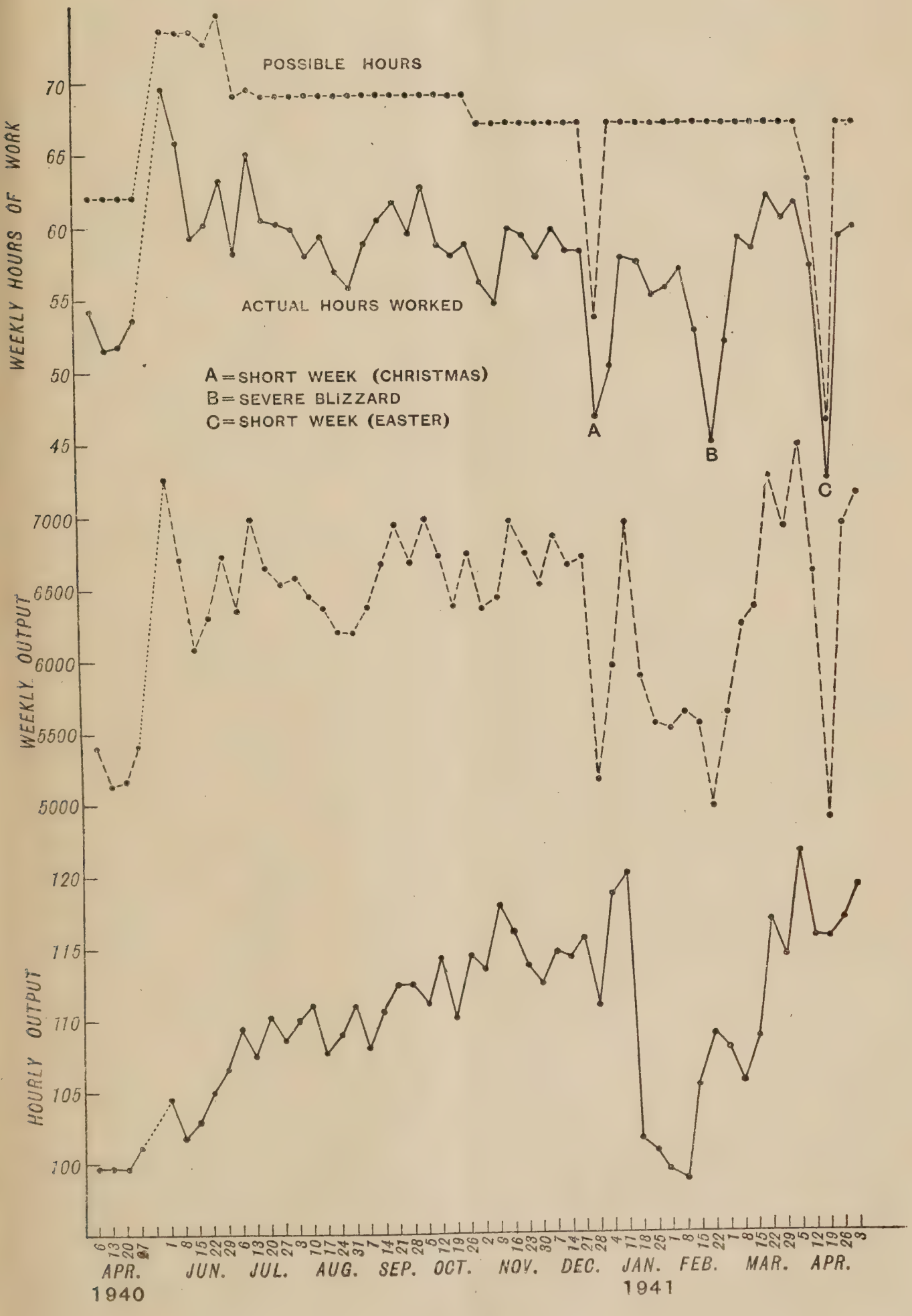

FIG. 5

TABLE VII.—*Monthly summary of the results in Fig. 5.*

Year and month.	Average possible hours of work.	Average hours worked.	Average hourly output.	Average weekly output.
1940				
April	62·0	52·8	100·0	5,280
June	73·5	63·6	104·1	6,621
July	69·1	60·6	109·2	6,618
August	69·0	57·4	109·7	6,297
September	69·0	60·0	110·8	6,648
October	69·0	58·8	112·4	6,609
November	67·0	57·8	115·5	6,676
December	63·6	55·5	113·7	6,310
1941				
January	67·0	55·1	108·2	5,962
February	67·0	51·5	105·1	5,413
March	67·0	59·8	111·2	6,650
April	62·0	55·8	117·6	6,562

Although work in this factory was sometimes interrupted by air-raid warnings, these were seldom numerous or prolonged, and were usually connected with enemy activity elsewhere.

(*b*) *Group C.*—The workers in this group comprised 200 men. The results obtained are given in Fig. 6 and Table VIII.

TABLE VIII.—*Monthly summary of the results in Fig. 6.*

Year and month.	Average possible hours of work.	Average hours worked.	Average hourly output.	Average weekly output.
1940				
April	65·7	57·2	100·0	5,720
June	67·0	61·3	103·0	6,314
July	67·5	58·8	107·1	6,298
August	65·7	58·6	109·4	6,411
September	65·7	58·5	111·6	6,529
October	65·7	57·6	113·3	6,526
November	65·7	54·5	110·5	6,022
December	59·5	48·6	111·0	5,395
1941				
January	60·5	54·4	109·8	5,973
February	60·5	53·8	118·2	6,359
March	60·5	53·1	125·2	6,648
April	57·2	50·4	132·3	6,668

The results from this group show a substantial rise in hourly output after the crisis in May, 1940. At the same time, there was a progressive increase in absenteeism until the middle of July, although the official hours of work, apart from an extra night-shift in two alternate weeks, remained the same as in the pre-emergency period. This increase in lost time, and the general unpopularity of the extra night-shift, caused the management to revert to the usual hours of work.

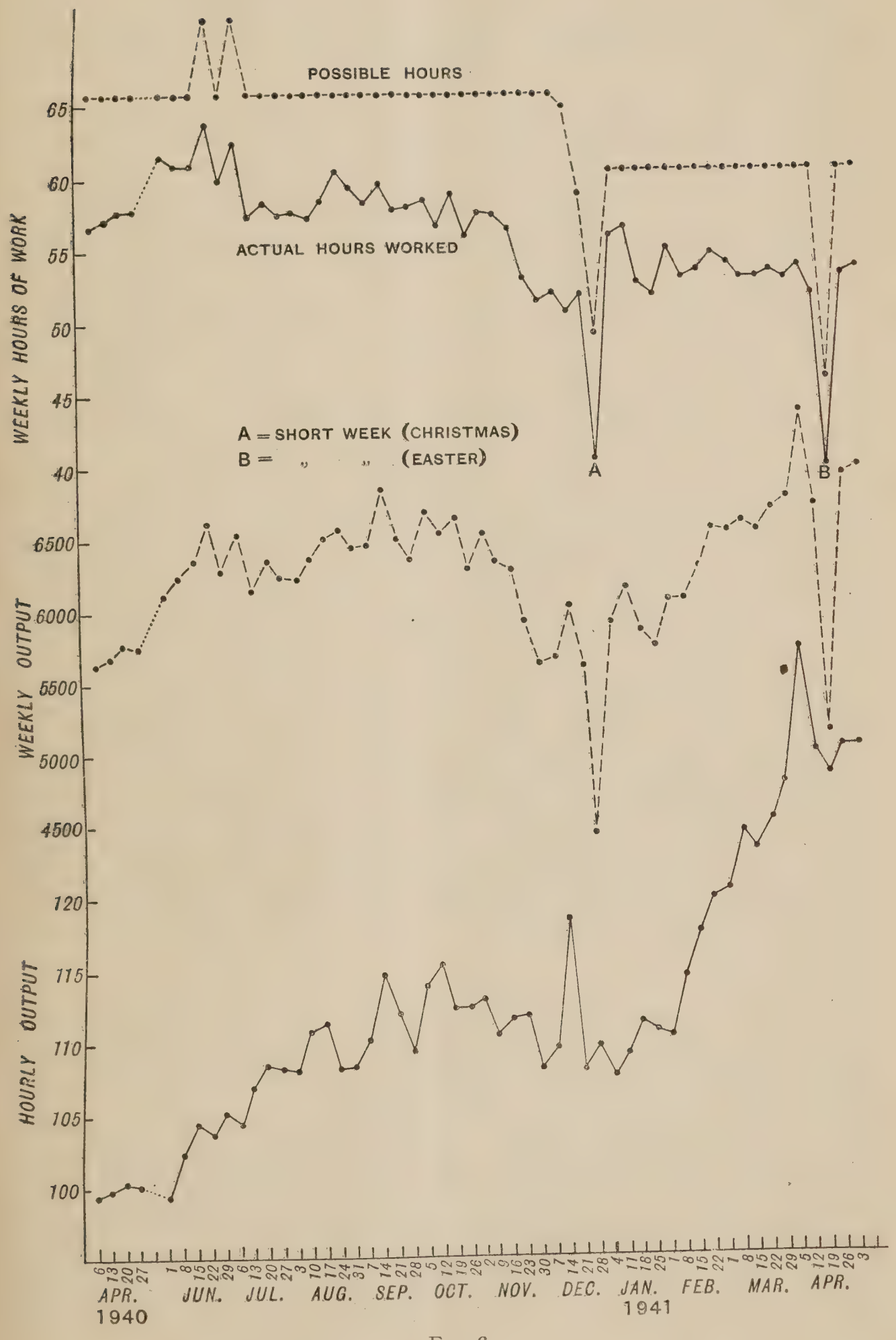
POSSIBLE HOURS
ACTUAL HOURS WORKED
A = SHORT WEEK (CHRISTMAS)
B = „ „ (EASTER)
A
B
WEEKLY HOURS OF WORK
65
60
55
50
45
40
WEEKLY OUTPUT
6500
6000
5500
5000
4500
HOURLY OUTPUT
120
115
110
105
100
APR. 1940
JUN.
JUL.
AUG.
SEP.
OCT.
NOV.
DEC.
JAN. 1941
FEB.
MAR.
APR.

FIG. 6

The general increase in hourly output from June to October represented, in the main, the response of the men to the appeal for more production. It was also helped by the gradual elimination of certain refinements in the operations, which facilitated the progress of work. Further, from the middle of July, a number of men were allowed one Sunday off per month, and this concession was augmented by staggered holidays of one week during August and September.

The decrease in hourly output which began in October and continued until the end of the year was due, in the first place, to the effects of increased enemy activity, which interrupted production and caused many men to stay away from work. There was also a general lack of enthusiasm among the workers at this time, which was attributed by the management to the combined effects of air-raids, dismal weather and the black-out. The official opinion seemed to be that the men were " not feeling good ", and about the middle of December they were notified that " with a view to maintaining the health of employees and reducing the amount of absence and lost time, it has been decided that employees shall have alternate week-ends off. This is to be arranged by half the employees working one week-end and the other half the next week-end ". The arrangement was discontinued after two weeks because of the need for output, but it was restored after another two weeks, and there is little doubt that this measure of relief was partly responsible for the subsequent increase in the rate of working. It not only helped to counteract boredom and fatigue, but it also stimulated the wage incentive, because of the loss of double pay for Sunday work. From January onwards the wages earned were also reduced by Income Tax deductions, but this decrease was neutralised to some extent by an increase in the basic rate of 4*s*. per week for skilled men. About the same time, the Minister of Labour appealed for more production and promised that rates would not be cut. Before this appeal, the men, according to one departmental manager, had been holding back, but now " they rolled up their sleeves and went to it ". This applied particularly to a few men who, since August, had been employed on a new type of article. The piece-rates for this job were at first temporary, but in January they were made permanent and consequently unalterable. That the men had much in reserve was shown not only by the marked increase in the rate of working in February and March, but also by the notable spurt in the week ending 14th December, which was the last chance to earn a little extra money before the Christmas holiday. A similar spurt occurred before the Easter holidays in April. It is difficult to avoid the conclusion that the men in this group, like those in Group B, were working at a comparatively easy pace before the speed-up at the end of May, 1940. Apparently, they were not fully extended until the fear of wage cuts was removed in February, 1941.

Combined results

In order to give a composite picture of the variations in hours and output under the two-shift system, which was in fairly general use throughout the country, the results obtained from groups of workers in five factories have been combined and averaged. They are given in Table IX.

The results show that the hourly output continued to increase throughout the period covered by the inquiry. The increase in June and July was due almost entirely to the extra effort made by the workers in response to the National appeal. Afterwards, it was due partly to the shorter hours of work and partly to the gradual improvements in methods of work, which reduced the time taken to complete a unit of output. Because of this increase in hourly output, the weekly output in March, 1941, was about the same as in June, 1940 (the height of the emergency period), although the number of hours worked was appreciably less.

TABLE IX.—*Combined results for workers on the two-shift system in five factories.*

Year and month.	Average hours worked per week.	Hourly output.	Weekly output.
1940			
April	51·6	100·0	5,160
June	61·0	102·0	6,222
July	58·1	104·0	6,042
August	53·9	104·4	5,627
September	53·0	106·9	5,666
October	54·2	108·6	5,886
November	53·9	109·5	5,902
December	49·7	108·5	5,392
1941			
January	53·0	110·1	5,835
February	52·0	112·2	5,834
March	54·4	114·8	6,245
April	50·5	117·9	5,954

Summary

The data obtained in this investigation, though limited in number and scope, have been carefully compiled and may be regarded as small samples drawn from widely different types and conditions of work. Further, the validity of the results is increased by the records having been restricted to the same individuals throughout the period covered by the inquiry. Though not conclusive, the results give some indication of the nature and effects of factors which increase or retard productive effort.

1. In all the groups, the rate of working was undoubtedly stimulated by the state of emergency, and the appeal for more production, in the latter part of May, 1940. Workers throughout the country were inspired to make good the material losses incurred as a result of the collapse of France; and the effect of this effort was reflected in the increased production obtained. As might be expected, the strength of this incentive gradually waned, but there is reason to believe that it always remained above the pre-emergency level and from time to time was stimulated by successes and depressed by defeats.

2. The appeal for more production was accompanied in most factories by an increase in the weekly hours of work, and the longer hours, together with the extra effort made by the workers, resulted in an immediate and substantial rise in weekly output. This initial spurt, however, was usually followed by a fall in both the hourly and the weekly outputs, which continued at a varying rate until the hours of work were reduced. The chief cause of this decrease was the additional fatigue and strain induced by the long hours of work. During this period the amount of time lost through sickness, injury and absence without permission rapidly increased, and the workers tended to become listless and stale. There is not the least doubt that a continuation of such long hours would have had increasingly serious effects on health and efficiency. Fortunately, this contingency was avoided by a reduction in hours which came into operation at varying times in June and July. The decrease in question not only caused improvement in the mental and physical health of the workers; it also stimulated the incentive to work, partly, it is thought, because of the loss of double pay which resulted from the curtailment or abolition of work on Sundays. The workers attempted to compensate for this loss by increased effort on the other days of the week.

It was also generally agreed that the long hours of work impaired the efficiency of the machines, because of the greater wear and the lack of time for adequate overhaul and repairs. Both minor and major stoppages became increasingly frequent, and the drop in weekly output observed in some groups in June, July and August 1940, was due partly to this cause. The situation was sometimes aggravated by shortage of skilled maintenance men.

The beneficial effect on the workers of the successive reductions in the weekly hours of work was strongly reinforced by holidays in August and September. In almost every case the holidays were followed by an increase in the rate of working; they seemed to dispel the last traces of fatigue and strain caused by the long periods of intensive activity, and they appeared to be relatively more effective than the preceding sequence of week-end breaks.

3. The flow of production in all the groups was interrupted by air-raid warnings. These varied in frequency and duration in different localities, and their disturbing effects made it still more difficult to determine the exact relation between output and hours of work. There were very few warnings during June, July and August, but afterwards they became more numerous and prolonged. Except in Factory A, however, output was seldom seriously affected, and the general adoption of the "spotter" system towards the end of the year, together with a lull in enemy activity, meant that there was little interference with production during January, February and March. The presence of enemy aircraft not only caused a loss of production proportionate to the time spent in shelters, but in some cases slowed down the rate of working after each stoppage, because of inadequate supplies of power or heat. Further, many warnings occurred when men on the night shift were about to leave home for work, and in some cases they were either unable or unwilling to make the journey. Their absence from work often caused a dislocation of inter-dependent operations.

4. Except possibly in Groups A1 and A7, the hourly and weekly outputs, when unhindered by enemy activity, were generally higher, and in some cases substantially higher than the corresponding outputs recorded before the emergency in May, 1940. The extent of the increase was partially dependent on the part played by the machine in the process of production. Thus in Groups A1, A2, A3 and A7, where work was largely dominated by the machine, there was little or no increase in hourly output. There were, however, several notable decreases when the operators were unable to keep the machines fully supplied with material or when the efficiency of the machines was impaired by excessive use. On the other hand, when the speed of work was largely or wholly dependent on the worker, as in Groups B and C, very substantial increases in hourly output were recorded. Between these extremes the extent of the increase was partly related to the degree of dominance exercised by the machine.

5. The fairly steady increase in the rate of working observed in some groups was due in part to the cumulative effect of gradual but almost imperceptible improvements in organisation and methods of work. In particular, there appears to have been some relaxation of certain peace-time standards, especially in the machining and finishing processes. This tended to reduce the time taken to complete an operation, and also relieved the strain on the worker. Above all, the flow of production was sometimes facilitated, and output increased, by larger orders, which ensured longer runs of the same product and fewer set-ups. Probably nothing was so disturbing to production as the frequent changes from one type of work to another, and there can be little doubt that the loss could be greatly reduced by more foresight on the part of those who plan and organise industrial needs.

Any substantial changes in the methods of work were, of course, accompanied by appropriate modifications in piece-work prices and, providing the same amount of effort continued to be expended by the worker, the piece-work earnings were supposed to remain unchanged. In the case of small but progressive improvements, however, there were usually no alterations to prices; hence output and earnings tended to rise.

It will be apparent from the preceding pages that the results obtained were influenced by many factors, and it would be useless to attempt to draw hard and fast conclusions regarding the relation between hours of work and output. All that can be said is that the long hours in June and July, 1940, plus the extra effort made by the workers, were usually detrimental to sustained productive effort, while the later results suggest that there is little to gain, and probably more to lose, when the weekly hours of work exceed 60 to 65 for men and 55 to 60 for women. Finally, the higher hourly output observed in most groups from June, 1940 to March, 1941, despite the longer hours of work, is evidence of the increased effort made by the workers in response to the national appeal for more production.

III.—LABOUR WASTAGE

Comparison of Ten Factories

In every factory a number of those employed drop out for various reasons, and the resulting economic loss is often appreciable. It is accordingly important to know something about the extent and causes of this wastage.

A crude but useful measure of labour wastage is the ratio between the number who leave in a given period to the average number employed in that period. Although more refined methods exist, this crude measure is enough for all practical purposes and has been used throughout this report.

Records of labour wastage have been collected from ten factories, representing fairly different types of work. The results cover the year ending June, 1941, and thus include the greater part of the emergency period. They are given in Table X, and show the number leaving each quarter expressed as a percentage of the average number employed.

TABLE X.—*Number leaving each quarter expressed as a percentage of the average number employed.*

Factory.	Average No. employed.	Sex.	1940.		1941.		Total for year.
			Third quarter.	Fourth quarter.	First quarter.	Second quarter.	
A1 ..	6,538	Male	16·8	10·3	6·7	5·5	39·3
A2 ..	5,077	Female ..	24·8	27·7	19·3	12·4	84·2
B ..	2,393	Chiefly male ..	5·0	5·4	6·3	4·4	21·1
C ..	4,506	Male	4·1	4·3	4·7	3·6	16·7
E1 ..	6,772	Male	25·4	30·0	16·4	4·1	82·0
E2 ..	8,990	Female ..			28·6	3·9	
F ..	3,357	Male and female	11·5	12·3	12·3	7·8	43·9
L ..	12,921	Chiefly male ..	4·2	5·4	3·7	1·4	14·7
M ..	6,239	Male	5·9	6·2	6·7	4·1	22·9
N ..	2,481	Female ..	10·8	14·5	12·5	6·9	44·7
Q1 ..	2,616	Male	7·3	6·9	5·1	5·4	24·7
Q2 ..	1,832	Female ..	16·7	15·9	12·0	9·4	54·0
R1 ..	1,705	Male	6·8	7·6	7·7	8·8	30·9
R2 ..	3,819	Female ..	22·6	23·8	16·1	12·8	75·3
Average..			12·5	13·1	10·4	6·7	42·7

The results show that the average number who left during the year in the different factories varied from 14·7 to 84·2 per cent. of the average number employed. The wastage was relatively high during the last half of 1940, but was usually less in the first quarter of 1941. In most groups there was a further decrease, sometimes substantial, after the introduction of the Essential Work Order in April, 1941. Under this Order, no person could leave his employment or be discharged (except for serious misconduct) without the permission of the National Service Officer.

The results also show that wastage was much higher among women than among men. This was due mainly to the increasing employment of many women who found it difficult to settle down to factory life. In some cases they disliked the work or were dissatisfied with factory conditions. Others, expecially the married, were unable to combine factory work with home duties and family responsibilities. Some had to travel long distances between home and factory and found the strain too great. This was particularly the case during the last half of 1940, when transport was often dislocated and homes sometimes damaged by enemy action.

Reasons for Leaving

The results in Table X show the amount of labour wastage. In some factories the reasons for leaving were also given, the chief categories are shown in Table XI.

TABLE XI.—*Reasons for leaving (number in each category expressed as a percentage of the average number employed during the year).*

	Factory.					
	A1.	A2.	B.	C.	E.	N.
Voluntary	23·0	61·7	15·9	8·4	75·0	41·9
Dismissed	11·1	22·5	2·2	3·8	4·8	2·0
Military service	5·2	—	3·0	4·5	2·2	—

Thus, in each factory a large majority of the workers leaving did so of their own accord, usually without giving any reason. The high figures in Factory A2 (women) and Factory E, where more than half the workers were women, were due largely to the causes already mentioned. In Factory E, additional factors were unsatisfactory canteen arrangements and the effect on health of certain chemicals used in the process.

Except in the case of Factory A, the number of workers dismissed was small and most of these were either medically unfit or guilty of misconduct. There were practically no dismissals for incompetence. In Factory A, where labour was more plentiful and standards of workmanship relatively high, dismissals for incompetence were more numerous.

Although the results show that the Essential Work Order reduced labour wastage, there were indications that the workers in some factories were finding ways of evading this Order. Thus, in Factory E, the number discharged as medically unfit before and after the Order came into operation was :—

TABLE XII.

Average number employed.	Before		After			
	February.	March.	April.	May.	June.	July.
18,364	0	0	4	65	71	95

There is evidence that these workers obtained medical certificates from their doctors to the effect that "their present occupation was detrimental, etc." or "the worker is unfit to continue in his present job". A large proportion of these workers were new entrants.

Further, since the Essential Work Order made it more difficult for discontented workers to leave, the number remaining at work increased. Some of these sought relief by taking time off, and it is possible that others followed their example. The increase in casual absenteeism observed in some factories after April was doubtless due partly to this cause.

There were also cases where persistent absentees were reported to the National Service Officer but no further action was taken. Because of this, the management felt that the new system was worse than the old, since it indicated to the delinquent that the firm was powerless to enforce attendance, and the workers, in fact, continued to go as they pleased. The management naturally resented being placed in such a quandary.

Summary

1. During the year ending June, 1941, labour wastage was high in some factories but low in others. It was higher for women than for men. Factors contributing to a high rate of wastage were :—

(*a*) the rapid expansion of industry and the employment of many workers especially women, who were unused to factory life ;

(*b*) the employment of an increasing number of married women who found it difficult to combine factory work with home duties and family responsibilities ;

(*c*) the additional strain imposed by travelling long distances to and from work ;

(*d*) the effect of air-raids on home life and transport, especially during the latter half of 1940 ;

(*e*) the lack of suitable facilities for meals in some factories ;

(*f*) the inadequate supervision of new workers.

2. Labour wastage was due largely to workers who left of their own accord. The number dismissed was usually very small.

3. Labour wastage was reduced after the adoption of the Essential Work Order of April, 1941, though there was evidence that some workers were able to evade this Order. There were also some complaints by managements, of lack of support from the National Service Officer

GENERAL CONCLUSIONS

1. The results of this inquiry show that the time lost by factory workers through sickness, injury and absence without permission, when undisturbed by extraneous factors, varied with the weekly hours of work. It was usually low when the hours of work were less than 60 per week, but increased as the hours increased up to 75.

2. The findings suggest that, over an extended period, the weekly hours of work should generally not exceed 60 to 65 for men and 55 to 60 for women.

3. In all the groups the workers were stimulated to an increased output after the collapse of France, and although it was physiologically impossible to maintain the maximum level reached, output in nearly every case has since remained above the previous level.

4. The beneficial effects of a reduction in excessive hours of work, together with the inauguration of staggered holidays, were reflected in an increase in the rate of working afterwards.

5. Labour wastage varied considerably from one factory to another. Some of the conditions leading to a high rate were the employment of women unaccustomed to factory work, or married women whose domestic responsibilities prevented satisfactory adjustment to factory life ; difficulties of shopping and getting suitable meals, and the problem of transport, were important in this connexion.

6. Women, on the whole, lost more time than men, for reasons such as those given in the previous section.

7. In conclusion, when it is remembered that many workers lived far from the factories, and had to face air-raids when travelling to and from work ; that some had lost their homes and had to sleep in improvised shelters ; and that often they had to wait outside in the cold and rain because of inadequate transport arrangements, the time-keeping of the factory personnel studied deserves high praise.

LONDON
PRINTED AND PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE
To be purchased directly from H.M. STATIONERY OFFICE at the following addresses:
York House, Kingsway, London, W.C.2 ; 120 George Street, Edinburgh 2 ;
39–41 King Street, Manchester 2 ; 1 St. Andrew's Crescent, Cardiff ;
80 Chichester Street, Belfast ;
or through any bookseller

1942
Price 6*d.* net

57402) Wt. 2243/848 5,000 12/41 Hw. G.344 S.O. Code No. 46–3–2*